STATE OF ALASKA

William A. Egan, Governor

Annual Progress Report for

DISTRIBUTION, ABUNDANCE AND NATURAL HISTORY OF THE ARCTIC GRAYLING IN THE TANANA RIVER DRAINAGE

by

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ANNUAL REPORT OF PROGRESS

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The Jobs included under Study R-I are as follows:

Job R-I-B Early Life History of the Arctic Grayling

Objectives

1. To determine the substrate characteristics, temperature, flow, topography, depth, and light conditions on the spawning grounds at Mineral Lake Outlet in relation to incubation time and fry emergence.

2. To find the ratio of males to females and year classes present in the spawning population.

3. To find the average fecundity of each year class.

4. To determine those fish that prey on grayling eggs.

Mineral Lake Outlet

Observations of the grayling spawning grounds at the Mineral Lake outlet began on May 3, 1971. A recording thermometer was placed in the outlet about 50 yards below the lake, a 2-inch stretch gill net was fished for two days with no catch, and a daily collection of basic chemical data was begun. The only open water in the outlet was at its source but there was a considerable flow under the ice.

On May 17, observation of the area was resumed. The outlet had opened throughout its length, but thick shelf ice remained along both banks. The water was slightly turbid in the outlet, but, about one mile below the lake (Figure 8), it mixed with the highly turbid water of the Little Tok River.

Gill nets fished at sites 1, 2, and 3 (Figure 8) revealed that grayling approached Mineral Lake outlet from the Little Tok River (Table 8). The first grayling, an immature, was captured at site 1 on May 19. The first large catch was made May 25 at site 2 and, at this time, grayling first appeared in Mineral Lake Outlet. A large number of immature grayling accompanied the adult fish, and several round whitefish were also associated with the run. By May 27, most of the grayling were concentrated in the one mile-long outlet of Mineral Lake as indicated by the nets at all sites being empty while fish were easily seen in the outlet. A net set across Mentasta Creek (the inlet to Mineral Lake) revealed that no grayling moved through the lake from May 28 through June 6.

Grayling using the Mineral Lake spawning site migrate upstream from the Tok River via the Little Tok River. It is probable they overwinter in the Tanana, but some may overwinter in the lower stretches of the Tok River. During the time grayling were spawning in Mineral Lake Outlet, the Little Tok, above its confluence with the outlet, and Trail Creek were surveyed upstream for about five miles. No grayling were taken in two man-hours of angling nor by drifting gill nets through five pools and riffles in each stream. Both of these streams are reported to contain grayling later in the season.

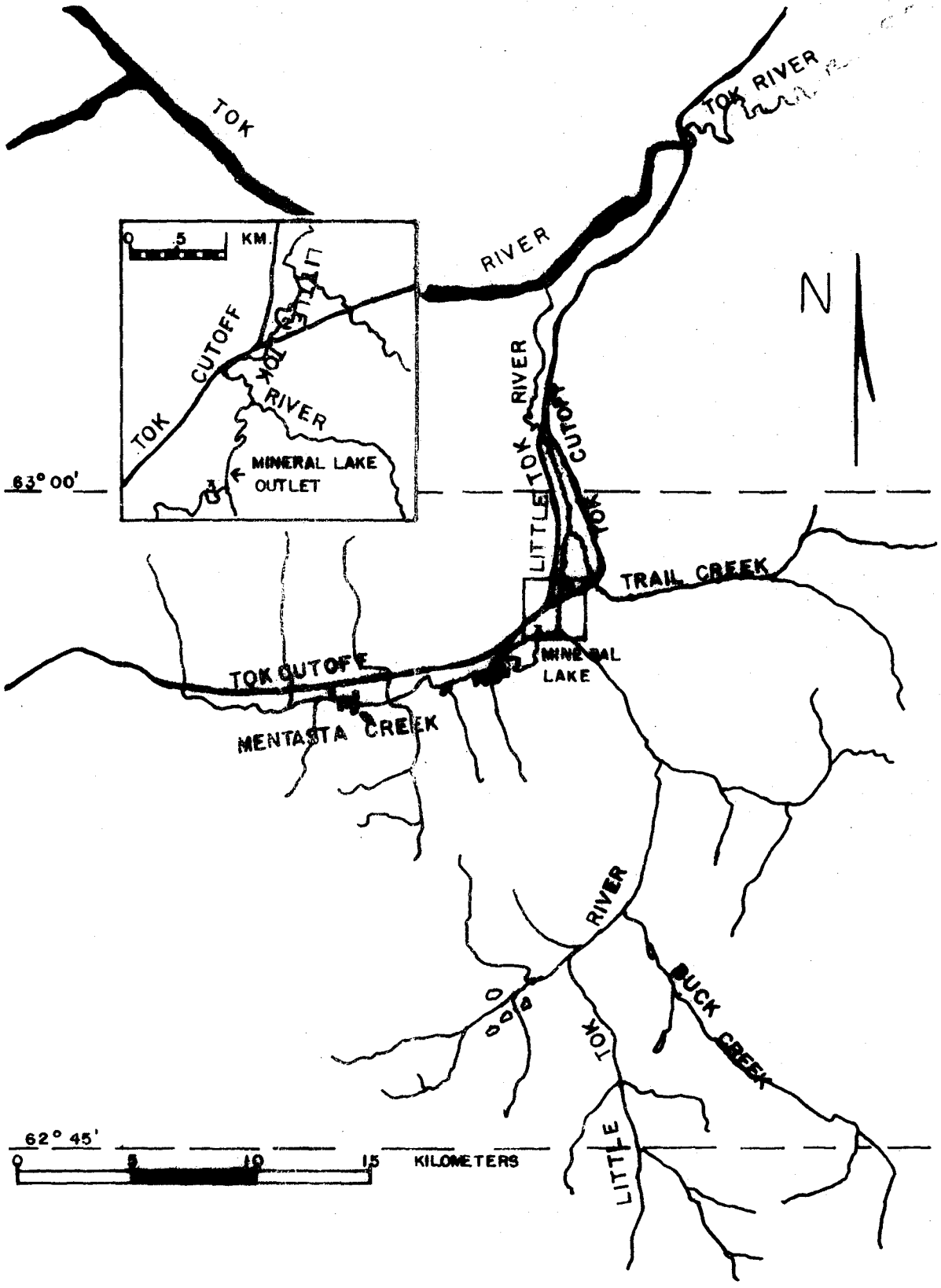

FIGURE 8 MAP OF MINERAL LAKE OUTLET STUDY AREA.

TABLE 8 Grayling Captured by Gill Net at Three Sites in the Little Tok River Drainage, 1971.*

Date	Little Tok Bridge (Site 1)	Cabin Bridge (Site 2)	Outlet of Mineral Lake (Site 3)
May: 18	0		
19	1		
20	0		
21	0	0	0
22	1	0	0
23	0	0	1
24	0	0	0
25	0	15	0
26		12	0
27		7	2
28		2	5
29		1	19
30		0	
31			
June: 1			
2			
3			

*See map, Figure 8.

The bottom material, flow, size, and morphology appear similar in Mineral Lake Outlet, Little Tok River, and Trail Creek at this time of year. The major differences are in temperature and turbidity.

Both the Little Tok River and Trail Creek were quite turbid at the time the grayling arrived in the area, but both cleared a few days later. On June 2, the Little Tok River above its confluence with Mineral Lake Outlet was more turbid than the outlet and 1°C cooler. On June 5, Trail Creek was clear and had a temperature of 6°C, while the outlet temperature was 7°C.

The spawning migration was about 10 days later in 1971 than in 1970 (Tack, 1971). When the first grayling was caught on May 19, 1971, the water temperature in the Little Tok River was 0°C and remained at 0°C for at least one more day.

In the previous report (Tack, 1971) it was hypothesized that the onset of spawning may be triggered by day length, clearing of the water, or temperature. From this year's work, it is clear that turbidity is not an important factor since the water cleared at least a week before spawning began. Day length could be a factor in initiating overall readiness to spawn, but does not trigger spawning as shown by the fact that spawning began 15 days

later in 1971 than in 1970. Spawning activity correlates well with changes in water temperature (Figure 9). The slow onset of spring illustrated this well as grayling were on the spawning grounds six days before the first spawning act was observed. The water temperature reached 4°C at this time. Following the first spawning activity, which was very slow, the weather cooled and the water temperature dropped below 4°C. During the two days the temperature remained below 4°C, no spawning was noted. Then on June 4, the air warmed and the sun shown causing a sharp increase in water temperature. This correlated with a marked increase in spawning activity. The following two days were also warm, the water temperature rose, and spawning activity was intense. By the evening of June 6, most fish caught were spent.

Behavioral observations were continued and more data were collected on the pattern of maturing, and on determining the various stages of maturity.

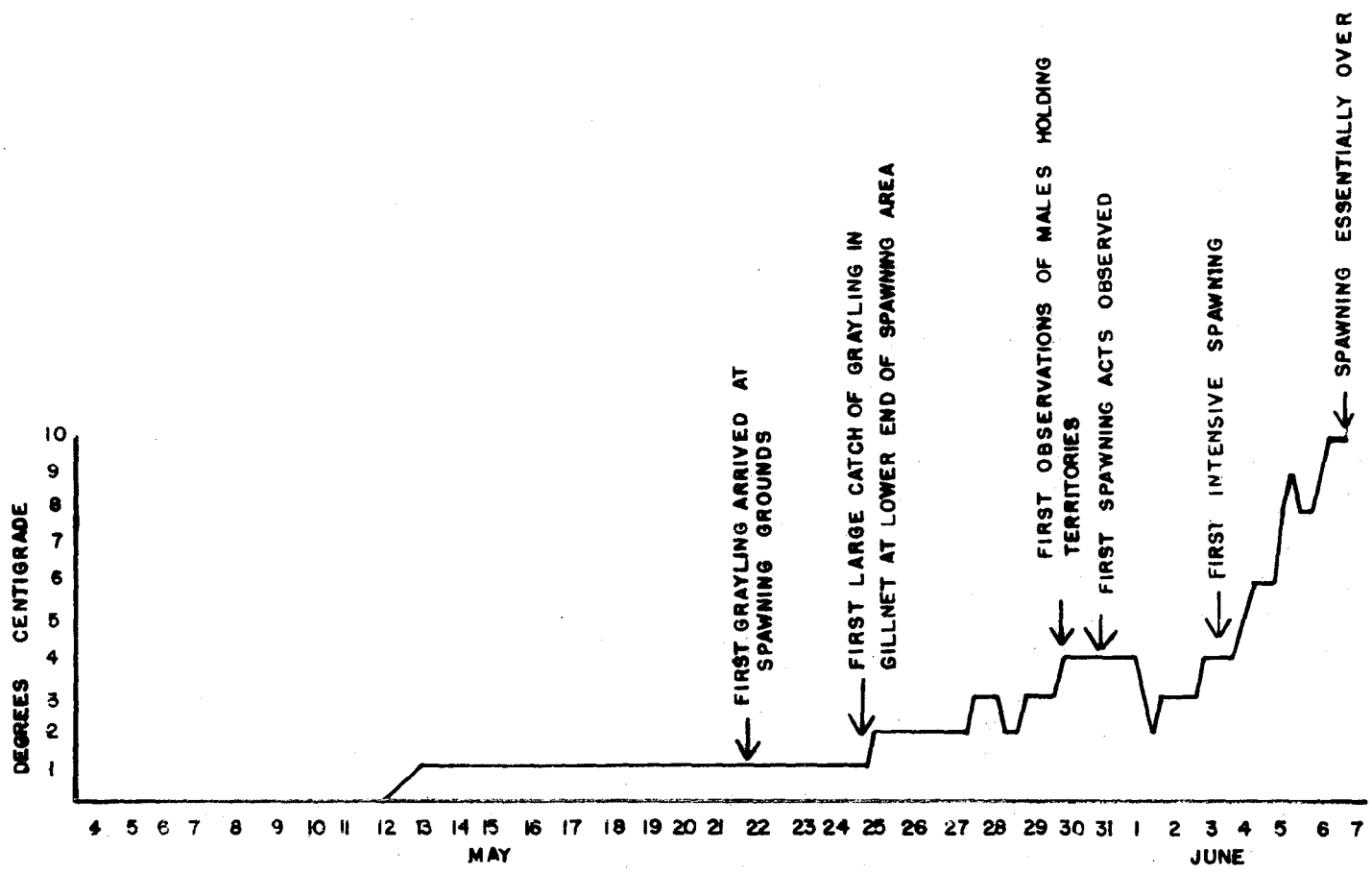

FIGURE 9 GRAYLING SPAWNING ACTIVITY RELATED TO WATER TEMPERATURE AT MINERAL LAKE OUTLET, 1971.